PROCEEDINGS

OF

THE ROYAL SOCIETY.

1849. No. 74.

November 30, 1849.

At the Anniversary Meeting,

The EARL OF ROSSE, President, in the Chair.

Dr. Roget, on the part of the Auditors of the Treasurer's Accounts, reported, that the total receipts during the past year, including a balance of £484 13*s.* 1*d.*, amounted to £3290 4*s.* 7*d.*; and that the total expenditure, during the same period, amounted to £2736 19*s.* 10*d.*, leaving a balance in the hands of the Treasurer of £553 4*s.* 9*d.*

The thanks of the Society were given to the Auditors for the trouble they have taken in examining the Treasurer's Accounts.

The thanks of the Society were given to the Treasurer,

List of Fellows of the Royal Society deceased since the last Anniversary (1848).

On the Home List.

Charles Frederick Barnwell, Esq., M.A.
Sir Codrington Edmund Carrington, D.C.L.
John Clendinning, M.D.
Major Thomas Henry Shadwell Clerke, R.E.
William Clift, Esq.
Samuel Cooper, Esq.
Sir James Fellows, M.D.
Edward Forster, Esq.
George Fownes, Esq.
John Goldingham, Esq.
Sir Graves Chamney Haughton.
Rev. James Devereux Hustler, B.D.
Right Hon. Sir Alexander Johnston.
Edward Hawke Locker, Esq.
Sir Geo. Steuart Mackenzie, Bart.
Edward Stanley, Lord Bishop of Norwich.
Sir William Pearson, M.D.
Sir Samuel John Brooke Pechell, Bart., Capt. R.N.
Louis Hayes Petit, Esq.
James Cowles Prichard, M.D.
Sir Charles Scudamore, M.D.
Right Hon. Sir George Warrender, Bart.
William Wix, Esq.

Withdrawn.

Very Rev. John Merewether.

Defaulter.

John Green Crosse, M.D.

List of Fellows elected into the Royal Society since the last Anniversary (1848).

On the Home List.

His Grace the Archbishop of Canterbury.
The Right Rev. the Lord Bishop of Manchester.
The Right Hon. Sir Francis Baring.
The Right Hon. Thomas Babington Macaulay.
John Couch Adams.
Thomas Andrews, M.D.
Robert Alfred Cloyne Austen, Esq.
Charles Barry, Esq.
Benjamin Collins Brodie, Esq.
John Dalrymple, Esq.
James Glaisher, Esq.
Sir Robert Kane, M.D.
William Lassell, Esq.
Henry Beaumont Leeson, M.D.
Andrew Crombie Ramsay, Esq.
John Scott Russell, Esq.
Francis Sibson, M.D.
Robert Stephenson, Esq.
Lieut.-Col. Philip Yorke.

The President then addressed the Meeting as follows:—

Gentlemen,

For some years there seemed to have been an increasing desire that the important business transacted on the 30th of November should be transferred to a meeting in June.

Strong reasons were urged in favour of the change. It was said that when St. Andrew's day was selected, the London season commenced much earlier than it now does, and that it was then probably the time when London was most full, and when there was reason to expect the largest attendance; that now, on the contrary, the Fellows who reside a part of the year in the country, are almost all out of town in November, and that practically therefore the burden and responsibility of very important duties is thrown upon a section of the Society, that portion of the Fellows who permanently reside in London; that in awarding the Medals in November, just after the vacation, there was this great inconvenience, that very nice questions often arising in weighing the conflicting claims of different individuals, the Members of Council were under the disadvantage of having had but few opportunities of mutually conferring on the subject, while they were without that assistance, which, if the Medals were awarded in June, they might derive from hearing the opinions

of the many distinguished men of science, who, coming from the universities, or their varied occupations in the country, are usually to be found in the metropolis after Easter. Other reasons were assigned more or less cogent, and in 1845 it was announced that the Council had concurred in the expediency of changing the Anniversary from November to June. In 1846 nothing was done; but in 1847 it was settled that there should be annually a General Meeting in June, the business being the election of the Fellows; the presentation of the Medals; the annual Address of the President, and the annual Obituary. Great doubts having arisen whether, without a new Charter, the time for the election of the Council and Officers could legally be altered, in that respect no change was made. The following year the first of the June meetings took place; the Fellows were then elected under the new regulations; and had my distinguished predecessor continued in office, with his long experience and thorough knowledge of the business of the Society, the changes resolved upon would probably have been fully carried out in June 1849. However, as June approached there were evidently difficulties; the time appeared to be too short for due deliberation in the award of the Medals, and even for procuring the necessary information for the obituaries, and there seemed to be no other choice but to abandon the attempt on that occasion of anticipating in June the business of the November Meeting.

That the wishes of the Society were not fully carried out in June 1849, was probably owing to my inexperience: it certainly was not owing to any want of zeal, or to an indistinct perception of the importance of the change which had been resolved upon. To have considered any change resolved upon by Council unimportant, would have been impossible; but in this instance the reasons which had been assigned for the change appeared to me to have been rather under than overstated. Even the mere question of convenience, constituted as society is in this country, is of obvious importance. How many young men of great ability, and perhaps ample fortune and high position, destined, as we might have flattered ourselves, to render science essential service, who having obtained the honours which our universities award to great scientific merit, have forsaken science at once! Had they sought admission here, no doubt we should have gladly welcomed them; and once fairly enlisted in the cause and actively employed, there is something so inspiriting in the example of others, something in the power of association so eminently calculated to draw forth all the exertions of which human nature is capable, that there would have been little danger of their ever afterwards abandoning scientific pursuits.

To such men, with their country pursuits, a November Session is inconvenient; quite as much so as to a member of Parliament. To transact the most important business of the year in November, is almost perhaps to repel them from our ranks.

The presentation of the Medals, and the reading of the Memoirs of deceased Fellows, having been postponed till November, the Address was postponed also.

It would have been impossible, however, to have suffered the first opportunity, that of the June Meeting, to have passed by, without expressing to the Fellows then present my deep sense of obligation for the honour they had conferred upon me, and without thanking the Council individually and collectively, for the kind manner in which they had been always most ready to assist. I am anxious now in a more formal manner to return my thanks, both to the Society and to the Council.

It was not without considerable doubt and apprehension that I ventured to undertake the duties of President: the doubts did not arise from any exaggerated estimate of the difficulty of the duties to be performed, from any mistaken idea that acquirements at once the most varied and the most profound were necessary. Had I thought so, without a moment's hesitation I should have declined the office, knowing there were other Fellows whose qualifications would have approached more nearly the required standard; but I did apprehend that it would not be in my power, or indeed in the power of any one actively engaged in the pursuit of practical astronomy, to give that amount of personal attendance during the winter months which might be required, not perhaps for the transaction of real business, but as a proper mark of respect from the President to the Society. It is only during the long dark nights, when there is a clear sky and no moon, that effective search can be made in the remote regions of the universe; and as favourable opportunities are rare, and once lost are sometimes lost for the season, frequent absence from the observatory during the winter would very seriously interfere with the progress of Nebular Astronomy. After Easter the nights are short; comparatively little can be done; the work is light, and may safely be entrusted to the care of an able assistant. When therefore it was intimated to me, most unexpectedly, that my name had been mentioned in connection with the vacancy about to be created by the retirement of Lord Northampton, I at once apprised my friends who were on the spot of the doubts and difficulties I felt, and above all, that nothing would be to me a source of more profound regret, than if elected, to find myself unable fully to meet the wishes of the Society. In return, having received the strongest assurances, that under all the circumstances the Society would make great allowance, and that constant attendance after Easter, and attendance on such other occasions as real business required it, would be deemed quite sufficient, my doubts were removed, and I resolved, if elected, at least to do my utmost to meet your wishes. The *soirées* had previously been held before Easter; but in that there was no difficulty, as all seemed to concur that after Easter would be quite as convenient. To the *soirées* I attach much importance: I think it very important that scientific men should have an opportunity of meeting each other: I think it very desirable in this country that classes should be brought together, and therefore I am convinced that my predecessor acted wisely in extending the invitations to his *soirées* beyond the precincts of the Royal Society. I further think that the *soirées* should be on such a scale, and so

conducted, as to appear to foreigners who honour them with their attendance, in every respect suitable to the position our Society maintains as the head of English science.

The *soirées* were last season for the first time held here. In the spring of 1848, during the Presidency of Lord Northampton, the University of London had been good enough to offer to lend three rooms adjoining our meeting-room for the President to hold his *soirées*. The offer was gladly accepted, and in pursuance of that arrangement in the spring of 1849, the cards were issued for the first time from Somerset House. Here there is ample space, and where the invitations are so numerous there is a possibility of a larger attendance on some one night than any ordinary London house could contain, without the greatest inconvenience. Whether the change upon the whole was pleasing to the great majority of the Society or not, I have as yet been unable to ascertain; but at the first *soirée*, had there been any trustworthy indication of the contrary, the three remaining *soirées* should have been held, as formerly, at the house of the President.

I have great pleasure in informing you that I have received a communication from the First Lord of the Treasury which I have had the honour of laying before the Council. Lord John Russell proposes, that at the close of the year, the President and Council should point out to the First Lord of the Treasury a limited number of persons, to whom the grant of a reward, or of a sum to defray the cost of experiments, might be of essential service. He states, that the whole sum he could recommend the Crown to grant in the present year is one thousand pounds, and that he cannot be certain that his successor would follow the same course.

Your Council have gladly accepted the offer made to them, as a means of promoting the advance of scientific knowledge; and they have felt particularly gratified by it, as an indication of the confidence reposed in them by Her Majesty's Government.

It is a source of extreme regret to me that I am unable to congratulate you on the return to his country of our long absent Fellow Sir John Franklin, who, with Captain Crozier, also one of our Fellows, and his other gallant companions, are now spending their fifth winter in the Arctic Regions. You will remember that it was partly at the recommendation of the Council of the Royal Society that the expedition under Sir John Franklin's command was despatched by the Admiralty, for the purpose of making one more effort to solve the problem of the North-West Passage, which has engaged the attention of England for three centuries.

We are therefore deeply interested in the successful issue of that enterprise. The researches of Sir James Ross prove beyond all reasonable doubt, that the missing expedition must have succeeded in attaining the western or south-western side of Melville Island; for as Sir James Ross selected Port Leopold for his winter-quarters, which is at the junction of the four great channels of Barrow Strait, Lancaster Sound, Prince Regent Inlet, and Wellington Channel, it was scarcely possible for any parties from the missing expedition to have

travelled eastward from Melville Island without falling in with Sir James Ross's expedition. If however Sir John Franklin should abandon his ships and take an easterly course, it is most satisfactory to know that he will find at Port Leopold a store of provisions for twelve months, with fuel and other necessaries, together with the steam launch of the Investigator, which has been lengthened and made available for the transport of Sir John Franklin and his party to meet the whaling ships in Lancaster Sound.

The great attention which the important subject of terrestrial magnetism has received from your Foreign Secretary, Colonel Sabine, and other members of the Society, leads me to mention that Lieutenant M'Clintoch, under the instructions of Sir James Ross, availed himself of his proximity to the magnetic pole to make several magnetical observations which are of very great value.

Sir John Richardson, with his companion Mr. Rae, examined the coast-line of North America, between the Mackenzie and Coppermine rivers, without finding any traces of the missing ships, or hearing any tidings of them from the numerous bodies of Esquimaux with whom they had interviews. Mr. Rae was instructed to resume the search in the summer of this year, and to direct his course northwards, between Victoria and Wollaston lands, and to penetrate, if possible, to the northern shores of Banks's land. The results of this attempt will be known in England in May next.

During the winter of 1848–49, Sir John Richardson and Mr. Rae were occupied in making experiments on the magnetic force and intensity with Lloyd's declinometer, and they kept meteorological journals, including the record of the movements of a Delcros barometer, which was carried without injury through the interior, and brought back in safety to England.

It is scarcely necessary to assure you that your Council have watched with very great solicitude, the efforts made by these eminent and able officers to relieve Sir John Franklin and his party; and although those endeavours have not produced the desired results, yet your Council is most unwilling to abandon hope, and they have felt it their duty to request the Lords Commissioners of the Admiralty to call a meeting of those naval officers who have served in the Arctic expeditions, in order that they may deliberate and report to their Lordships respecting the best measures to be taken under existing circumstances, to continue and bring to a successful issue the search for the missing expedition; and feeling confident that every means will be tried which the vast resources and energies of this great nation command, I do sincerely trust that it will be my pleasing task, when addressing you again from this chair at our next Anniversary, to report, that under the blessing of Almighty Providence, the endurance and skill of British seamen have triumphed over all those formidable difficulties which make the Arctic Regions a scene of trial and danger.

During the past year, or even for a longer period, the progress of scientific discovery abroad appears to have been less striking than usual. The gentle excitement of science is too feeble to hold pos-

session of the mind amidst great political changes, and politics no sooner intrude than science is forced to retire. Still, under very unfavourable circumstances, our neighbours, I think, have displayed a greater amount of scientific energy than perhaps the most sanguine could have ventured to anticipate.

Without attempting to give an outline of the progress of foreign science, which would occupy too much time, or pretending to assign the order of merit to the achievements of the distinguished men to whom that progress is due, it is impossible not to direct especial attention to the remarkable researches of Weber on Electrodynamical Measures; a work where we have a happy combination of applied mathematics, ingenious device, and judicious experiment, resulting in important discoveries. His work commences with a description of a new and very ingenious instrument, which he calls an Electrodynamometer. It consists of two coils of fine wire, the smaller of which is suspended within the other by a bifilar suspension, so that their centres coincide, and their axes are at right angles. He calls the latter "the multiplier," the other "the bifilar (or rather suspended) coil." They are so connected, that the current to be examined traversing the multiplier, passes by the suspending wires through the suspended coil, which turns by their mutual action through an angle whose tangent measures the intensity of their action. The angle is measured as in the German magnetometers, by observing with a telescope the reflexion of a scale placed at a considerable distance in the mirror, carried by the bifilar coil. The action between the coils is as the square of the intensity of the current, while that exerted on the needle of a rheometer is simply as the intensity.

1st. He obtains *absolute* measures of the intensity by the use of a small magnetometer, whose magnet is a steel mirror, which is placed at a proper distance, and deflected by the action of the fixed coil, "or multiplier," according to the principles laid down by Gauss, and thus refers them to the earth's magnetism as a standard.

2nd. He applies this instrument to verify Ampère's fundamental law of electrodynamics, and from it he computes the action of a single ring on another, in three different relative positions of their centres, the last being where they coincide, as in this instrument; and finally, he computes the mutual action of combinations of such rings. In each the action is as the square of the intensity multiplied by a constant, which is a function of the dimensions of the coils, and the distance of their centres; and he finds that the computed deviations agree with the observed with an error never exceeding four seconds of space.

3rd. He applies the instrument to measure the intensity of an induced current, thus:—Let the suspended coil be made to oscillate round its vertical axis, while a constant current is passed through the fixed coil; if the extremities of the former be connected, a current is induced in it, which changes its direction twice in each oscillation, and which therefore shortens the arc of oscillation. Observe the decrements of this arc under the influence of the current,

and of a pair of magnets placed symmetrically, and parallel to the axis of the suspended coil; thus we have the relative intensities of the induced currents, and the intensities of the inducing forces are obtained by observing the deflections which they produce on that coil, excited by passing a feeble current through it.

4th. The instrument may be applied *in conjunction with the rheometer*, to determine the *intensity* and *duration* of instantaneous currents. In the latter instrument the moment of rotation is as the intensity; in the former as its square. The angular velocities generated in them are as these moments and the time; but also as the times of oscillation inversely, and the extreme swings of each directly. It follows therefore that we have two equations from which the intensity and the time can be determined. He illustrates this by measuring the time of the discharge of a Leyden battery through a moistened cord, and points out other applications of importance.

5th. The instrument differs from the rheometer in not being affected by the direction of the current; it therefore will measure currents whose direction changes rapidly, and which therefore would produce *no visible* effect in the rheometer, as they neutralize each other's action in it. Such *alternation* currents may exist; they would be a vibration of the electricity, not a progress of it. He suggests that the undulations of light might produce effects of this kind, and gives as an example the action of the sound waves: a bar of steel properly arranged being made to sound, deflections of twenty or thirty divisions of the scale are produced. To go into the development of the theory by which he deduces, from axioms given by observation, the laws of electrodynamic action, would occupy too much time; and I will only add, that he generalizes Ampère's law, and transforms it into one depending on electric mass, velocity and distance. From this he deduces the theory of constant currents and that of Volta-induction in all its cases. The slight account I have given of Weber's researches, conveys but a very inadequate idea of their importance; a more detailed notice would have been unsuitable to the present occasion.

A most important contribution has recently been given by Professor Dove to the science of Meteorology—his maps of the *monthly* isothermal lines of the globe. In 1847 he communicated to the British Association a table of the mean temperature of 800 stations, for every month of the year, and to it he has since added 84 stations. From this table he has constructed his maps. In the memoir which accompanies the maps, he explains shortly, but clearly, his methods of proceeding; he had previously communicated them at length to the Berlin Academy. He also deduces from the facts brought to light by his extensive generalizations, new views of peculiar interest in their bearing on the science of Climatology. To have separated the annual mean heat received from the sun into its invariable *monthly* proportions, or those of season, was, as it appears to me, a great step, the greatest probably that has hitherto been made in the science of Climatology. It affords the key to the scientific understanding of

the conditions of climate, which are found to vary so greatly even in the same latitude and at the same elevations, and affect so importantly all organic creation. The generalization of a vast mass of material has been ably carried out, and in the true spirit of Inductive philosophy.

The first volume of a great work by the distinguished philosopher Dr. G. S. Ohm has just reached us: he calls it his Molecular Physics, and dedicates it to the Royal Society as an acknowledgement of his obligations to us, for that praise and encouragement which sustained him in his arduous labours. He received the Copley Medal in 1841.

While science has progressed abroad, at home it has not remained stationary. Sir William Hamilton's daring conception of a new system of imaginaries, and the successful application which he has made of it to the Geometry of three dimensions, have, as might have been expected, given rise to other speculations of the same nature. The first of these fruits of the theory of Quaternions was the triple algebra of Professor De Morgan (Cambridge Philosophical Transactions, 1847). The aim which the author proposed to himself was to frame systems of imaginary trinomials, in which the rules of operation should be the same as in ordinary algebra; and accordingly he makes it an essential condition that the *commutation* property of multipliers (abandoned in the theory of Quaternions) should be maintained. The memoir is highly suggestive. The general and analytical character of the author's treatment of the subject adds much to its intrinsic interest. The subject is however regarded on the *algebraic* side; and the question of geometric interpretation is hardly considered.

Professor Graves, on the other hand, has taken up the problem of the imaginary trinomials in its *geometrical* aspect (Proceedings of the Royal Irish Academy 1845); his object being "to frame for the Geometry of three dimensions a theory strictly analogous to that by which Mr. Warren has succeeded in representing the combined lengths and directions of right lines in a plane." The new distribution symbols of operation employed by Mr. Graves are imaginary cube roots of positive unity. His system is closely allied to one of those proposed by Professor De Morgan, but appears to lend itself more readily to geometric interpretations.

This part of the subject comes under the head of "Symbolical Geometry,"—a science, the first step of which was made by M. Argand, in the geometrical interpretations of the sign $+$, and which Sir William Hamilton has done so much to mature and perfect, in connection with his theory of Quaternions.

A symbolical method differing in many of its details has been recently proposed by Professor O'Brien (Cambridge Philosophical Transactions, 1847), and exemplified in its application to the theory of the vibratory motions of an elastic medium.

The department of applied mathematics, which appears to have made the most important advances within the last few years, is the theory of the motions of fluids and elastic solids. The theory of fluid motions had until recently been restricted by the hypothesis, that the action of two adjacent elements was *normal* to the separating

surface. It therefore failed to embrace the laws of those motions which depend upon the tangential forces called into play by sliding, and was accordingly inapplicable to many important cases of fluid motions; such for example as the motions of water in pipes and canals. M. Navier was the first to free the theory of hydrodynamics from this embarrassing restriction, and to give the corrected equations of fluid motion, friction being taken into account. In this he was followed by M. Poisson, in a memoir published in the 'Journal de l'Ecole Polytechnique;' and the subject has recently been ably handled by Mr. Stokes, in a paper published in the Cambridge Philosophical Transactions, 1847. In the same paper, the author has treated also of the theory of motions of elastic solids, and has corrected some of the speculations of Poisson upon the subject.

The theory of the motion of elastic solids is connected with, and taken in its most general form, embraces, that of the luminiferous ether; and accordingly we must date from the period of Navier's investigations, the large and rapid generalizations which the wave theory of light has received from the hands of Cauchy, Green, and M'Cullagh; and the same theory (motions of elastic media) in the hands of Mr. Haughton (Transactions of the Royal Irish Academy, 1849), based upon the comprehensive method of Lagrange, and freed from all that is arbitrary and hypothetical, has enabled its author to compare together from a higher point of view the theories of light just referred to, to explain the grounds of their resemblance, and to point out their essential distinctions.

The connection which has just been referred to, between the theory of the motion of elastic solids, and that of the luminiferous ether, was long ago dimly perceived, and has ever been regarded as a difficulty in the hypothesis of undulations. Upon this curious subject we may refer to some interesting remarks by Mr. Stokes (Cambridge Philosophical Transactions, 1847) in a memoir already referred to, which go far to remove the difficulty. It is probable, as he remarks, that the tangential force called into action by a relative displacement of the molecules, exists in *all* bodies; and there are good grounds for believing that these displacements, in the case of the luminiferous ether, are much within the limit at which the molecules would assume a new permanent arrangement, and thus exhibit the property of fluidity.

Before leaving this subject, we must not omit to notice the new treatment of the wave theory of light in the hands of Prof. Challis (Cambridge Philosophical Transactions, 1847). In this theory the author regards the ether as a *continuous* fluid substance, and applies to it the usual equations of hydrodynamics. It is assumed to be of the *same* uniform density and elasticity, within and without the medium; and the diminished velocity of propagation is supposed to be due to the obstacles which the atoms of the medium oppose to the free motion of the etherial particles. A polarized ray in this theory is that in which the condensation of the ether is unsymmetrical relatively to the axis of the ray.

Instruments are essential in the purely experimental sciences; and

even in the physical sciences most dependent on applied mathematics, sooner or later a stage is arrived at when for further progress instruments are of vital importance.

Without instruments even the theory of gravitation would have been little more than a sublime speculation; and the theory of light at the present moment is perhaps in that condition when that mathematician would effect the most who best prepared the way for judicious and refined experiments. Such being the importance of instruments, this Society I am sure cannot have failed to take a lively interest in the improvements in progress at Greenwich. In 1843, the Astronomer Royal proposed that an altitude and azimuth instrument should be constructed with a peculiar adaptation of materials, so as to secure as far as possible exemption from change, and so make it practicable to observe with great accuracy at a distance from the meridian. The object was a very important one; to procure a more extensive, and a more complete series of lunar observations; and when we recollect that Greenwich has had the honour of supplying the world with the best series of lunar observations extant, that upon that series the lunar theory and the lunar tables rest, surely it was an object, if not of national pride, at least of great scientific interest, that in that department of astronomy at least nothing should be wanting which could add to the efficiency of the National Observatory. The instrument was soon after commenced, designed by the Astronomer Royal; it has now been for some time in use, and I believe fully answers the purpose.

It had been found that the meridian instruments were of insufficient optical power for observing the minute planets, and the faint stars used as stars of comparison. In consequence, the Astronomer Royal designed a transit circle to carry an object-glass of eight inches aperture, and twelve-and-a-half feet focus; to be made of cast iron, with the same precautions against change which had been found so effectual in the altitude and azimuth instrument. Cast iron, being stiffer than brass and expanding less with heat, possesses great advantages; and unless it shall be found to be more liable to permanent change of figure under moderate strain, it will probably hereafter enter very largely into the construction of astronomical instruments. The great transit circle is in progress, and when completed no doubt it will be worthy of the place it is destined to hold among the Greenwich instruments.

Important however as these new instruments will be as a means of making better and more numerous observations at Greenwich, I think they are still more important to science, as unquestionable indications of progress in the construction of astronomical instruments in *this country*. Traditional routine seems here for many years to have kept us behind our continental rivals in this noblest department of mechanical art. Astronomers above all other persons are apt to cling with pertinacity to the imagined perfection of their instruments and methods; and the artists who construct the instruments, conscious of their own practical skill, and not unfrequently deficient in the high theoretical knowledge required to guide it, are still more

likely to believe themselves infallible. Thus the mural quadrant kept its ground, long after its liability to excentricity and change of figure had been recognized. The zenith sector is only now losing its authority; and it was the invariable practice of this country, at least up to the last twenty years, to rely without examination on the accuracy of divisions. The splendid talents and high authority of Troughton contributed mainly to this state of things, and accordingly as long as it lasted we remained passive; while in other countries, especially Germany, they were developing new principles of construction, and new modes of observation.

Among these may be named,—1st, the system of *engine division*, which possesses the advantage of being capable of progressive improvement, each circle when examined giving the means of imparting greater accuracy to that which shall follow it; while original division must be liable to an amount of error which will never fall below an assignable amount, depending on causes that cannot always be estimated. 2nd. The principle of casting circles in one piece, and as far as possible avoiding that complication of pieces and screw work so fatal to permanence of condition, which has been the characteristic of English instruments. 3rd. The recurrence to extra-meridional observations, and the use of the collimator in all its forms.

Notwithstanding the brilliant success with which these changes have rewarded the labours of Bessel and Struve, we have been slow to recognize their value. I have therefore had the greatest pleasure in directing your attention to the important improvements which the Astronomer Royal is effecting in the instrumental apparatus of Greenwich: there the instrument-maker and the engineer are, as they should be, working under the guide of high science; and even were these instruments, all or any, to be found on longer trial to fall short of their first promise, I should still regard them as important facts. An experiment, when wrought out under the guidance of high intellect and extensive knowledge, is scarcely less precious to science in its failure than in its success: it precludes further trials in an erring direction; it opens out new paths, and clears away impediments, so that the next step will far more probably be sure.

The progress of Physiology and Anatomy during the past year has not been marked by any striking discovery, like that of the circulation, or of the functions of the different roots of the nerves, or of the vibratile cilia of certain mucous membranes, or of the organization and development of the teeth and other supposed extra-vascular bodies. It has been characterized rather by the comprehensive and philosophic spirit in which the very numerous, and hitherto perhaps too much insulated series of facts have been studied and expanded, through the attention of the able cultivators of those sciences being evidently attracted more to the points of resemblance and analogy than to those of individual and minute differences; and by the rapidly advancing proof of the essential unity of the animal and vegetable divisions of organic nature and of the importance of the elementary cell, or vesicular form of living matter in the development of the various tissues in animals as well as plants.

The relations of the hepatic cells to the biliary secretion are discussed and illustrated by microscopical examinations, in a paper by Mr. Wharton Jones, printed in the second Part of the Philosophical Transactions for 1848; in which Professor Henlé's suggestion, that the hepatic cells correspond to endogenous cells, is argued to be correct.

Dr. Robert Lee has communicated the results of his laborious dissections of the nerves of the heart, illustrated by drawings, the elaborate beauty of which is exemplified by the engravings from them, published in the first Part of the Transactions for the present year.

A most valuable paper on the structure and development of the liver, based upon a wide extent of research into its comparative anatomy, has been contributed by Dr. Handfield Jones to the same part of the Transactions.

The anatomical structure and physiology of the papillæ of the tongue, in which resides the sense of taste, have received extensive illustrations by the persevering and ingenious application of the microscope to those organs in the living frog by Dr. Waller; the peculiar structure of the tongue of this animal adapting it for a scrutiny which in most instances can only be made upon the dead tissues of animals.

The concluding paper in the first Part of the current volume of the Transactions, by Professor Owen, gives the results of the application of his principles for determining the homologies of the vertebrate skeleton to the complex structures forming the carapace and plastron of the Chelonian Reptiles; and may be considered as one of the most interesting and important links in the chain of illustrations of that great principle which is so identified with his labours. In this elaborate communication each element is clearly defined and distinctly named,—the precise amount of correspondence with the ordinary vertebrate skeleton is definitely determined to the extent of their modifications,—and the nature of the superadded parts is illustrated by tracing the growth of the whole from the embryo state.

In anatomy the parts must first be accurately observed and described, but it is essential to its progress as a true science, contradistinguished from mere accumulation of recorded facts, that the relations of the parts be determined, not only as they are connected with one another in the same body, but as they are modified and repeated in different animals.

When the same part is thus recognized under all its adaptive modifications, a definite name may be applied to it, or it may be signified by a symbol. The anatomist thereby acquires the power of expressing propositions of the highest generality in his science in the briefest and clearest terms. The possibility of such an approximation of anatomy to the nature of the exact sciences can only be doubted or rejected by those who have failed to discern, or who deny, that a common type or pattern has governed the construction of animal bodies.

The evidence of this fundamental fact has been progressively accumulating since the first stimulus to the inquiry was given by the

early anatomical essays of the poet Goethe; and it may confidently be stated that the most characteristic feature in the recent progress of anatomical science, has been the establishment of the principle, as applicable to the vertebrated classes, in the works, "On the Archetype of the Vertebrate Skeleton," and "On the Nature of Limbs," by the distinguished author of the memoir already alluded to, On the Homologies of the Skeleton of the Chelonian Reptiles.

Several points of interest occur in the progress of Physiological Botany during the past year.

Professor Schleiden, in the new edition of the first volume of his "Grundzüge der Botanik," modifies the opinions he formerly held on the subject of cell-formation. He now admits with Nägeli, that the original coating formed around the cytoblast is not the cell-membrane, but a layer of protoplasm, the nitrogenous substance from which a layer of cellulose is subsequently secreted. He also admits the division of cells by the separation of the nitrogenous lining of Mohl's 'primordial utricle,' into two halves, between which a cellulose membrane is secreted. These views are very different from those propounded in his earlier treatise on Phytogenesis.

Count Suminski's remarkable observations on the reproduction of Ferns have attracted much attention. The process of generation described by that author has been questioned in an essay by Dr. Albert Wigand, who has minutely investigated the subject. Our authors have adopted Suminski's views, but apparently without having made original observations.

M. G. Thuret has described organs similar to the supposed antheridia of Ferns, as found by him on germinating Equiseta.

M. W. Hofmeister has published an elaborately illustrated memoir on the Origin of the Embryo of the Phanerogamia; he concurs in the views of Amici and Mohl. Mr. Henfrey has communicated to the Linnæan Society a series of observations, by which he arrived at similar results; but Professor Schleiden still maintains the doctrine that the apex of the pollen-tube becomes the embryo, and M. Schacht, who has obtained the prize offered by the Dutch Institute for an Essay on Vegetable Embryology, advocates the same opinion. On the other hand, Professor Unger has published an essay on the development of the embryo, in which he directly opposes Prof. Schleiden. Various other memoirs of interest, on the subject of development of special structures or of the organs of particular tribes of plants, have appeared in the Botanical Journals, chiefly from German authors.

The Discourse on Parthenogenesis, by Prof. Owen, contains points of much interest to the physiological botanist.

I have given a very slight and imperfect outline of some of the recent contributions to the progress of human knowledge; of Chemistry and of Geology I have said nothing: it would have been impossible to have entered upon so wide a field without extending this Address far beyond all reasonable limits. Enough, perhaps, has been said to show that discovery is progressing in a continually accelerated ratio; and as each new discovery, as a new example of *design*, tends continually to keep ever present to our minds the great truth

that *design* is everywhere; the grand object of all science (as it was evidently regarded by the greatest man who ever occupied this chair) has been fully answered.

Sir Roderick Murchison,

I have the greatest pleasure in placing in your hands the Copley Medal. Such labours as yours, which have contributed so much to the progress of geology, are certainly fully entitled to the highest honour which this Society can confer. Your three great works, 'On the Silurian System,' 'On the Geology of Russia,' and 'On the Structure of the Alps,' are so well known that I merely name them; and I will only add that I feel confident the Council in this award carry with them the approbation not merely of those who make geology their especial study, but also of the great body of the Fellows of this Society, to whom that popular and captivating science is without doubt an object of deep and increasing interest.

Dr. Blakiston,

In the absence of Colonel Sabine, who I deeply regret to find is prevented by severe indisposition from being present, permit me to request you to receive the Royal Medal for him. The Medal has been adjudged to Colonel Sabine for his valuable paper 'On Terrestrial Magnetism' in our Transactions. Colonel Sabine has had the peculiar merit of bringing the energies of many to bear upon this important subject, under circumstances the most favourable.

He, thoroughly acquainted with the instruments best adapted for magnetic expeditions, and with their use, took care so to instruct the officers as to enable them to make observations of a character the most trustworthy.

On shore, or on the ice, nothing more is required than care and practical dexterity; at sea there are great difficulties, and of a new class. The observations are affected by the polar magnetism, the momentary induced magnetism of the iron of the ship, and the changes of the polar magnetism. All this was first brought to light by Colonel Sabine: means were devised by him for obtaining the necessary corrections, and thus observations at sea were made comparable in point of accuracy with observations made on shore. In the theoretical part of this work Colonel Sabine had the valuable assistance of Mr. Archibald Smith.

In Colonel Sabine's last paper, he collects all the results relating to magnetic declination, and embodying them in a map compares them with theory, and so makes them at once available for the use of the practical seaman, and the advancement of theoretical magnetism.

I am most happy that the Royal Medal has been conferred on Colonel Sabine, not only on account of the great intrinsic value of his labours, but as marking the Royal Society's desire to encourage the reduction and discussion of the mass of magnetic observations which have been collected by government officers.

Dr. Mantell,

In presenting to you the Royal Medal for your paper 'On the Structure of the Jaws and Teeth of the Iguanodon,' published in the Philosophical Transactions for 1848, I have great pleasure in assuring you that the Council of the Society appreciate highly the merits of an important series of papers which you have previously written on that fossil animal, and your labours in the field of geology generally.

The President then called upon Mr. Bell to read the biographical notices of some of the deceased Members, which he then handed to him.

It is many years since the scientific world has had to deplore a loss so severe as that which it has recently sustained in the death of Berzelius, whose varied and indefatigable labours for fifty years in the science of chemistry have rendered his name illustrious throughout the civilized world.

Jöns Jacob Berzelius was born on the 20th of August 1779, the same year in which our own Davy first saw the light, at the village of Wäfersunda in East Gothland. His father was parochial schoolmaster in Linköping, but died before his son emerged from boyhood. At the age of 17 he entered upon the study of Medicine in the University of Upsal, where, in the laboratory of Afzelius, a man little versed in experimental inquiry, and consequently possessing but little practical knowledge of his science, the first analytical essays of Berzelius were made. He was thus necessarily thrown upon his own resources, and compelled to discover for himself, by reflection and reading, the explanation of the new and unforeseen phenomena which presented themselves in the course of his experiments: with what success he thus applied himself he was soon to furnish ample proofs. In 1798 he passed his examination in Philosophy, and shortly after he engaged himself as assistant to a physician residing at the baths of Medevi. A chemical analysis of these springs furnished the subject of his first scientific publication, which ushered in a series of papers on a variety of most important topics connected with chemistry, and which followed each other in rapid succession during the remainder of his long and valuable life.

In 1804 he graduated as Doctor of Medicine, and shortly after established himself in practice at Stockholm. He had already acquired such reputation by his researches, that he was immediately appointed assistant to Spaurnau, then Professor of Medicine, Botany, and Pharmaceutical Chemistry in the University of the capital; and on the death of the Professor, which occurred in 1806, he was elected to the vacant chair. Berzelius was by this appointment bound to give lectures, both upon Medicine and upon Chemistry; those he delivered on Medicine were highly successful, but his early courses of Chemistry were by no means popular, as, in conformity with the

general custom at that time prevailing in Sweden, he contented himself with reading his discourses, without attempting any experimental illustrations. It was not until after his visit to England in the year 1812, during which he was present at some of the lectures delivered by Dr. Marcet at Guy's Hospital, that he altered his style. It is related, that at the request of Berzelius, Dr. Marcet furnished him with a list of experiments adapted for exhibition in the class-room. On his return he immediately adopted the demonstrative method of teaching, and speedily improved upon and added to the hints which he brought with him from England, and soon rendered his course highly popular and attractive.

From this time titles and decorations flowed in upon him; he was knighted, subsequently appointed Commander of the Order of Wasa, and eventually was made a peer of the realm; and although these honours added nothing to the lustre of his name, they yet showed that his countrymen could appreciate a man who, by his numerous and important discoveries, so eminently adorned and dignified his native land. In the year 1813 he was made a Foreign Member of the Royal Society, and indeed he was elected before his death a fellow of almost every scientific society in the world; amongst others, he became one of the eight Foreign Members of the French Academy of Sciences.

At the age of 33 he was elected President of the Stockholm Academy of Sciences, and it was as Perpetual Secretary to that body, a post which he held till his death, that he published those valuable yearly critical reports upon the progress of Physics and Chemistry which he commenced in 1822, and which exercised so wholesome an influence upon the progress of research. These reports combined a masterly review of different important theories as they arose, with a clear and concise retrospect of the advances made in the science in the intervals of their appearance.

Berzelius did not marry till late in life. In 1832 he resigned that Professorship which for six-and-twenty years he had held with such renown; he did not however relax in his zealous devotion to that science, the advancement of which had formed the chief business of his life, and was occupied till within a short period of his death in preparing for the press the fifth edition of his 'System of Chemistry,' a work in eight 8vo volumes, which displays in a striking manner the laborious industry and minute accuracy which characterized him. During the last two or three years of his life his bodily powers began to fail, and about six or eight months before his death he was attacked with paralysis of the lower extremities; his mind however continued active and vigorous, but his strength gradually sank, and he expired tranquilly on the 1st of August 1848.

In person Berzelius is described as of stout make and of middle size, capable of much physical endurance; he possessed a mild, agreeable expression of countenance, and a peculiarly pleasing smile; his manners were extremely simple and unpretending, but at the same time courteous and polished. It may be taken as a strong proof of his generous and candid disposition, and of the high respect enter-

tained for him, that notwithstanding his firm and unsparing criticisms on the labours of others, he was rarely involved in scientific controversy of a personal nature.

The mere enumeration of the labours of Berzelius, to whom as an individual Chemistry is indebted for a larger and more varied store of new facts and observations than have ever before been collected by one man, would involve a sketch of the history of Chemistry in its more important phases during the last forty years. We must therefore content ourselves with mentioning a few of the more important topics that engaged his attention.

Some of his earliest papers related to the physiological and chemical actions of the Voltaic pile, then recently discovered, and engrossing the attention of all philosophers. The most important of these researches were connected with the decomposition of the alkaline earths, by forming their amalgams, and included the discovery of that singular substance the amalgam of ammonium, in which the two gases hydrogen and nitrogen unite with mercury and form a compound which still retains the metallic character. From these researches he was led to his Electro-chemical theory, the foundation of which was laid by Davy, but which received many important modifications, and a systematic application to chemical combination in general, from the hands of Berzelius. In the year 1806, he, in conjunction with Hisinger, commenced a publication at regular intervals, entitled 'Memoirs in Physics, Chemistry and Mineralogy,' composed of papers of great interest and importance in each of these branches of science. This work was continued for twelve years, and contains no fewer than forty-seven original papers from the pen of Berzelius. Shortly after appeared his remarkable work 'Lectures on Animal Chemistry,' a treatise which abounds in original observations, and which gave form to a branch of the science at once the most difficult and least understood. This work furnishes a variety of new modes of analysis, and details the experimental examination of most of the secretions, of the chemical composition of which till then little or nothing was known.

It was indeed in the prosecution of analysis generally that the consummate skill of Berzelius was eminently conspicuous. Analytical chemistry may be said to have originated in Sweden under Bergman; but it was entirely remodelled by Berzelius, who introduced a variety of new methods and a degree of precision and certainty into its operations which were before unknown.

Whilst Dalton was pursuing the train of investigation which led to his celebrated atomic hypothesis, Berzelius, in ignorance of the views of our countryman, was labouring in the same track; and in following up the experiments of Wenzel and of Richter, the important bearings of which he at once recognized, had been led to the performance of a number of exact analyses, which completely confirmed the happy generalizations of Dalton.

These results he published in an 'Essay on the Doctrine of Definite Proportions.' The masterly style in which the subject was treated contributed in no small degree to the rapid adoption of these new

and important views—views which furnish at once the foundation and the touchstone of all accurate chemical analysis. From this period he was for several years actively engaged in perfecting and applying the theory, and in determining the chemical equivalents or combining proportionals of the elementary substances. The progress of this long and laborious inquiry, which has furnished the most valuable series of constants chemistry possesses, obliged him to examine almost all the elementary bodies and the principal inorganic compounds then known, and which, besides enabling him to add greatly to the extent and accuracy of our knowledge of these substances, was also the occasion of the discovery of a multitude of new combinations. His researches revealed to us the existence of three elementary bodies before unknown, viz. of selenium, the remarkable analogue of sulphur; of thorinum and of corium, the metallic bases of two bodies of earthy character. To him also we owe our knowledge of the properties of zirconium and of silicium; he it was who established the acid character of silica, a discovery which he subsequently applied with such happy results to the systematic classification of minerals. Among compound bodies which he investigated, his careful examination of the fluorides, and of the compounds of the sulphurets with each other, is perhaps the most important.

Having thus determined the chemical equivalents of the elements, Berzelius proceeded to apply his results to the science of mineralogy. His well-known treatise on the use of the blowpipe, an indispensable manual for every one who desires to derive the full advantage from the employment of this useful instrument, must be considered as one of his most important contributions to the literature of mineralogy and of chemistry. But it is the systematic application of the doctrine of definite proportions to the analysis of mineral bodies in general, which will be regarded as one of the most remarkable and successful of his labours as a philosopher. So highly did the Royal Society estimate this establishment of mineralogical classification upon the basis of chemistry, that they marked their sense of it with the highest honour in their power to bestow, by awarding to him the Copley Medal for the year 1836. The Philosophical Transactions contain one paper by Berzelius, published in conjunction with his friend Dr. Marcet, in the year 1813; it is entitled 'Experiments on the Alcohol of Sulphur, or Sulphuret of Carbon.'

A man of such universal acquirements and acknowledged accuracy was well-qualified to act as the historian and the censor of his science, and for twenty-five years he faithfully performed these important offices.

Careful, patient and indefatigable, he was a true personification of the inductive philosopher. No labour was too great, no subject too repulsive, no precaution too minute, if it promised to repay the object for which the investigation was made: always relying on facts, collecting, extending and multiplying them in all directions, before he attempted to theorize, his theories always naturally arose out of the facts they represented, and when promulgated generally commanded ready acceptance.

It will not excite surprise that the death of such a man was regarded in Sweden as a national calamity, or that for two months the members of the scientific societies of his native land wore mourning as a tribute of respect to his memory.

William Clift was born at Burcombe, near Bodmin, on the 14th of February 1775, and was the youngest of seven children of the same parents. His father, Robert Clift, died a few years after, leaving his widow and family in narrow circumstances. William was put to school at Bodmin, and soon distinguished himself by the facility with which he acquired and the tenacity with which he retained whatever he was taught. Having a strong natural talent for drawing, some productions of his early pencil attracted attention, and brought the youth under the notice of Colonel Gilbert of the Priory, near Bodmin; and the good disposition and promising abilities of the young artist made him a favourite with both the Colonel and Mrs. Gilbert. This amiable lady had been the schoolfellow of Miss Home, and maintained a friendly correspondence with her after her marriage with John Hunter. Thus Mrs. Gilbert became acquainted with the loss which Hunter had sustained by the departure of his able anatomical assistant and draughtsman William Bell, for Ceylon, in 1790: she accordingly communicated to Mrs. Hunter the qualifications of her young *protégé*, and strongly recommended him as likely to prove a satisfactory successor to Mr. Bell. Her advocacy was successful, and William Clift was sent to London, approved of, and in the year 1792 was apprenticed for six years to John Hunter, who received him into his house, without a fee,—the services of the youth, as amanuensis, anatomist, and artist, being the sole equivalent expected for this inestimable advantage at the outset of his career. Unfortunately John Hunter died, October 16th, 1793. During the brief period in which these relations subsisted between him and Mr. Clift, they appear to have been most satisfactory to both. There was no lack of employment. The young apprentice was roused at six in the morning, and earlier in the summer season, to assist and attend upon the great anatomist in the dissections which he carried on before breakfast. The coarser anatomical labours of maceration and injection, the copying out of detached MSS. records, and making sketches and drawings of the parts displayed, occupied the day; and in the evening he was called to the desk of his indefatigable master to write from dictation, usually until midnight.

This was a severe course of labour for a youth of seventeen: yet such was the goodness of heart, the simple earnestness of purpose and kindness of demeanour of the master, that no other sentiments were engendered in the congenial mind of the apprentice save those of the warmest affection and deepest reverence for the memory of him whom he ever regarded as his best teacher, benefactor, and friend.

"From the very beginning," writes Mr. Clift, "I fancied, without being able to account for it, that nobody about Mr. Hunter seemed capable of appreciating him. He seemed to me to have lived before

his time and to have died before he was sufficiently understood;.....the more I have seen, the more I have known, the more I have learned, and the more I have thought, the stronger the conviction grows, that I shall never look upon his like again." These sentiments and affections were soon to be put to a severe trial. Hunter died in difficulty and debt: the sole provision for his family was his museum. The executors, Dr. Baillie and Mr. Home, were young men struggling against the difficulties that oppose the early progress of the physician and surgeon.

"I was left alone," writes Mr. Clift, in the memorandum already quoted from, "until the year 1800 in charge of the Collection, with two gallons of spirit occasionally to keep it from decay, and with seven shillings a week,—all, I was told and believed, that could be spared,—at a time when the quartern loaf was, for a short period, two shillings. Thus I had no obstruction to my studies, but unluckily no one to direct them. It is true, I had a large part of Mr. Hunter's manuscripts put into my custody, and, having these stores at my discretion, I naturally consulted them, having no other books to read nor money to buy any; and anxious to learn something of the Collection left solely to my charge, I read them over and over, and in this way made myself somewhat acquainted with the end and object of the Collection generally, and with the history of many of the individual preparations; and every step thus acquired made me desirous to acquire more." In the meanwhile, Dr. Baillie gave Mr. Clift free admission to his anatomical lectures, and Mr. Home (afterwards Sir Everard) occasionally employed him to assist in his operations on private patients, or in the dissection of rare animals.

Mr. Hunter's premises consisted of the residence in Leicester-square, a house in Castle-street, and the museum which he had built in the intermediate space. The house in the square was let to lodgers; the house in the rear was inhabited by Mr. Clift and the old housekeeper of the family; and with no other aid than this, Mr. Clift undertook the custody of the museum until Government should determine to accept or decline the terms on which it was offered by the testamentary directions of Hunter.

The first proposition in 1794 had been ill-received by the minister. "What! give £20,000 for bottles—we want the money to buy gunpowder!" was the reply of Pitt, when the subject was first broached to him by Banks. But Sir Joseph was not easily discouraged, and his endeavours, with those of other friends of science and cherishers of the memory of Hunter, were at length successful. After seven years' siege of the Treasury, the Premier sanctioned the introduction of a measure by which Parliament became the purchasers of the Hunterian Collection for the sum of £15,000, and it was then transferred to the Corporation of Surgeons, in a better state of arrangement and preservation than when it received in 1793 its last addition from the hands of its immortal founder.

I have digressed into these details in order to place in its true light the debt which science owes to William Clift, and what must ever

be regarded as his chief merit, viz. his single-minded fulfilment of arduous duties under peculiar difficulties, and his noble self-devotion to the achievements and memory of his great master, during the period that elapsed between his decease and the ultimate transfer of the Collection to its present worthy custodians. Mr. Clift has described the almost solitary condition in which he suddenly found himself with this great and important charge. At an age when the passions are strongest, in a metropolis teeming with opportunities and temptations,—not unconscious, moreover, of his own abilities and of the advantage which his apprenticeship to Hunter would give him in the pursuit of the practice of surgery,—neither pleasure, profit, nor ambition, could make him swerve from the course of duty to which he had devoted himself.

The Corporation of Surgeons having accepted the Hunterian Collection on the terms proposed by Government, was very properly re-incorporated by charter, dated 22nd March 1800, under the title of the Royal College of Surgeons.

One of the first acts of the College, in taking upon itself this new bond of relation to the natural sciences, was to appoint Mr. William Clift Conservator of the Museum, under the superintendence of a Board of Curators chosen from the Council. And the Board, elected on the 3rd of June 1800, in its first 'Report,' expresses "its satisfaction that the Conservator has manifested qualifications for all the important offices under the distinctions of Arrangement and Description, as well as for his other duties," p. 7. And in the first statement of the expenses of the Museum is the item—"Salary and gratuity to the Conservator from Christmas 1799"—the date of his appointment—"to Midsummer 1801"—£145.

From this time forwards the time and talents of Mr. Clift were exclusively devoted to the advancement of comparative anatomy and physiology, either indirectly by the preservation and increase of the Museum, or more immediately by anatomizing and depicting the structure of new or little-known animals.

Sir Everard Home having undertaken the charge of preparing a catalogue of the Hunterian Collection, much of Mr. Clift's time was occupied in assisting that gentleman in investigations which seemed to relate to the desired object. The results of most of these labours have been recorded in the Transactions of the Royal Society, and, with few exceptions, the illustrations of the numerous papers on Comparative Anatomy, by Sir Everard Home, are from the accurate and elegant pencil of Mr. Clift.

Pending the absence of catalogues, the preparations of the Museum were orally explained to visitors by the Conservator, whose style and matter bespoke the genuine Hunterian source from which he had derived his knowledge of the nature and scope of the Collection. On every occasion, also, Mr. Clift's time and knowledge were at the service of all who, in the investigation of any subject of anatomy, physiology, or palæontology, had occasion to consult the Museum under his charge. His own immediate contributions to science, at least those bearing his name, are but few. Two only

appear in the Transactions of the Royal Society; the first is entitled "Experiments to ascertain the Influence of the Spinal Marrow on the action of the Heart in Fishes," and is printed in the 105th volume of the Philosophical Transactions in the year 1815; the second and last contribution to the Royal Society was his "Description of some Fossil Bones found in the Caverns at Oreston," printed in the volume for the year 1823.

Both papers are characterized by the clearness and simplicity of the style in which the facts and experiments are narrated, and by the soundness of the conclusions deduced from them.

By the judicious choice of the subject of his experiments, and the care and skill with which they were performed, Mr. Clift, in the first of these papers, established, in contravention of the conclusions to which M. Le Gallois had arrived, that the action of the heart continues long after the brain and spinal marrow are destroyed, and still longer when the brain is removed without previous injury to its substance; together with some interesting collateral conclusions.

Soon after the publication of these memoirs, Mr. Clift was elected a Fellow of the Royal Society, and served on the Council of the Society in the years 1833 and 1834. He communicated some memoirs to the Geological Society, two of which, "On the Fossil Remains from the Irawaddi" and "On the Megatherium," are published in the Transactions of that body. Most of the works or memoirs, however, on the fossil remains of the higher classes of animals, which have appeared since Sir Everard Home's first paper on the Proteosaurus, in the Transactions of the Royal Society for 1814, until within a recent period, are more or less indebted to Mr. Clift, either for his determination of the fossils described in them, or for his accurate and beautiful figures of them. Numerous and hearty are the acknowledgements by their respective authors to Mr. Clift for this valuable assistance. In Dr. Mantell's original memoir on the Iguanodon, published in our Transactions in 1825, the author says, "Among the specimens lately collected, some, however, were so perfect, that I resolved to avail myself of the obliging offer of Mr. Clift, to whose kindness and liberality I hold myself particularly indebted, to assist me in comparing the fossil teeth with those of the recent Lacertæ in the Museum of the Royal College of Surgeons. The result of this examination proved highly satisfactory, for in an Iguana we discovered teeth possessing the form and structure of the fossil specimens." And Baron Cuvier, in the concluding volume of his great work on Fossil Remains, acknowledges his obligations for many drawings, "faites par M. Clift, dont le beau talent a enrichi ce recueil de tant de planches non moins remarquables par leur exécution que par leur fidélité."

To return, however, to the more immediate field of Mr. Clift's labours, I find it recorded in the edition of the Synopsis of the Museum of the Royal College of Surgeons, published by the Council in 1845, that, "under Mr. Clift's superintendence the removal of the Collection from Castle-street, Leicester-square, to a temporary place of deposit in Lincoln's Inn Fields, in 1806, and thence to the Museum of the College in 1813, was effected without the slightest

damage to any of the frail and delicate preparations of which it, in a great part, consists." And the best testimony to the exemplary fulfilment by Mr. Clift of his responsible duties is afforded by the present condition of the Hunterian Collection, and the great accessions it has received during his able conservatorship. From the duties of this office Mr. Clift was allowed to retire with a full salary, which had been progressively increased to 400*l.* per annum, a few years before his decease, which took place on the 20th of June, 1849, six weeks after that of his wife, to whom he had been tenderly attached and united more than fifty years.

He has left an only daughter, married to his successor, who combines with the office of Conservator of the Museum, that of Hunterian Professor to the Royal College of Surgeons; and this notice of the worthy and estimable colleague whose loss we now deplore, cannot better be concluded than in the words which his son-in-law has inscribed upon his monument:—"He carried a child-like simplicity and single-mindedness to the close of a long and honoured career."

Edward Stanley, D.D., Lord Bishop of Norwich, and Clerk of the Closet to Her Majesty, was the youngest son of the late Sir John Thomas Stanley, Bart., of Alderley Park, in Cheshire; whose eldest son, having inherited the baronetcy by the death of his father, was subsequently created a peer by the title of Baron Stanley of Alderley, and still survives, the oldest Fellow of the Royal Society.

The late prelate was born on the 1st of January 1779, and was consequently in the seventy-first year of his age at the period of his death. He was partly educated at the grammar-school of Macclesfield, was afterwards entered of St. John's College, Cambridge, and was a Wrangler at that University in 1802.

His early predilection for the navy is well known, and it is believed that it was not without reluctance that he yielded to the wishes of his family to forego a profession to which his youthful taste and inclination so much attached him. But to whatever pursuit his ardent and energetic mind was once directed, there was no after-hesitation, no drawing back from the duties to which he had devoted himself, and no lukewarmness in the manner in which those duties, whatever they may have been, were fulfilled by him. In his position as a parish-priest, in the incumbency of the family-living of Alderley, and, in a still more remarkable manner, after his elevation to the Episcopal authority, his active and energetic mind seems to have sought relaxation only in a change of labour; and he retained to the latest period of his life the same incessant occupation of mind and active bodily exertion which had characterized the earlier part of his life. He was equally remarkable for the great simplicity of his heart, the unbounded charity and kindness of his feelings, and the cheerfulness of his conversation and manners; and he possessed, in an extraordinary degree, the power of attracting the respect and personal attachment of those even who differed from him in opinion on matters which too frequently tend to produce personal animosity, and lead to the breach of many a friendship.

The Bishop very early evinced a great fondness for the study of

Natural History, which he never lost, although the occupations and labours of his subsequent life never allowed of his acquiring a profound knowledge of any branch of that science. The only work he ever published on natural history was 'A Familiar History of British Birds,' which was intended for young persons. It is written in a pleasing and interesting style, and evinces much of that kindness of disposition for which its author was so much esteemed.

He was many years President of the Linnæan Society, and always evinced great interest in the welfare of that Society, as well as of the British Association, to which he was attached from its commencement. He was elected a Fellow of the Royal Society in 1840.

The incessant labour and excitement, both of mind and body, which had been for some time making secret inroads on his health, at length occasioned him to seek change and comparative repose in a visit to Scotland; but he was seized there with congestion of the brain, and died at Brahan Castle, near Dingwall, on the 8th of September last.

The Right Honourable Sir Alexander Johnston of Carnsolloch, in the county of Dumfries, was distinguished by a long and glorious career of the most philanthropic and beneficial labours for the amelioration of the natives of Ceylon and of the continent of India. His early life was marked by many romantic incidents, and his education in the East was carried on under such a concurrence of circumstances of the most unusual and remarkable kind, as have perhaps scarcely been paralleled, and all tending in a most remarkable manner to fit him for that career, to which circumstances apparently fortuitous afterwards conducted him. In his fifth year he had acquired a knowledge of the French language, having been with his parents in France from his infancy; and he accompanied them to India, whither his father went in a high official appointment under Lord Macartney, then going out Governor of Madras; and it is remarkable that in that country he should have received the different branches of his education from men who afterwards became themselves distinguished, and who from family attachment were ready to supply the want of regular school instruction to their young friend—such were Sir Thomas Munro, General Leith, Colonel Mackenzie, and Schwartz. His early association with distinguished natives, and his father's anxiety to render his constitution strong and enduring, led to so extraordinary a proficiency in every kind of manly and athletic exercise, that he was offered a cornetcy in Sir Henry Floyd's regiment of light dragoons, in his eleventh year. His mathematical studies, in which he became a proficient, were aided by his mother, herself a daughter of Lord Napier of Merchistoun, and a worthy descendant of the famous inventor of logarithms.

On his return with his parents to England he pursued the study of the law, and having afterwards been called to the bar, went the home circuit for a short time.

Circumstances however were preparing for him a change in his destiny, for which he was admirably suited, and in 1802 he accepted

the office of Advocate-General in the King's Court at Ceylon, then about to be established under the government of Lord Guildford. He had previously married Miss Campbell, the only daughter of Lord William Campbell, second son of John fifth Duke of Argyle. From this period Mr. Johnston bent all the powers of his mind to the one favourite object of his life, the introduction of such measures as should be the means of raising the moral and political character of the natives, first of the island of Ceylon, and afterwards of the continent of India. His appointment to the office of Chief Justice, which took place in 1805, and afterwards, in 1810, to the additional office of President of H.M. Council in Ceylon, gave him the power to carry out his great object with energy and effect. Of the manner in which his arduous and philanthropic duties and objects were fulfilled, the best attestation is to be found in the words of two distinguished statesmen who have respectively borne their testimony to his great merits; the late Marquis of Londonderry said, that he had "the great glory of having given freedom of conscience, of establishing trial by jury, and of abolishing the slave-trade throughout the island of Ceylon:" and Lord Grey observed in the House of Lords, that "no person had ever before had the honour of introducing three such measures into any country, and that his conduct in the island of Ceylon had immortalized his name." Sir Alexander returned to England in 1819, and in 1832 he was sworn of the Privy Council. He was one of the original founders of the Royal Asiatic Society, of which he was for some time a Vice-President. He was elected a Fellow of the Royal Society in 1810. He latterly resided principally on his family estate in Scotland, where he continued to exercise in private life that benevolence which had been the leading characteristic of his public labours.

George Fownes, Ph.D., late Professor of Practical Chemistry in University College, who died of consumption on the 31st of January last, before completing his thirty-fourth year, was the eldest son of Mr. John Fownes of Coventry-street. Dr. Fownes's original destination was for trade, but he early evinced a taste for science, and when about seventeen or eighteen years of age he became a member of the Western Literary Institution in Leicester-square, and with the late Mr. Everett, Dr. Henry Watts and others, established a philosophical class, in which they contributed to their mutual improvement by lecturing and making experiments. After 1837, when he entered the laboratory of Mr. Everett, an accomplished analyst, who was then chemical lecturer at the Middlesex Hospital, Dr. Fownes devoted himself entirely to the pursuit of chemistry, spending a portion of 1839 under Professor Liebig at Giessen, and afterwards engaging as assistant for a year in the laboratory of University College. He afterwards lectured successively at the Charing Cross and Middlesex Hospital Medical Schools, and in the school of the Pharmaceutical Society; and on the establishment in 1845 of the Birkbeck Laboratory of Chemistry in University College, he was nominated to its direction, upon the recommendation of his friend Professor Gra-

ham. Here he succeeded in organizing an excellent system of practical instruction, and was highly successful as a teacher, notwithstanding the declining state of his health for the last two years of his life.

The name of Dr. Fownes is connected with two popular works—a Manual of Chemistry, and the Acton Prize Essay of the Royal Institution, entitled 'Chemistry, as exemplifying the Wisdom and Beneficence of God,' published in 1843. But the high scientific reputation which he rapidly obtained was chiefly founded upon his researches and discoveries in organic chemistry, which indicated great clearness of perception and precision of analysis, and gave promise of a distinguished career. The most important of these was his paper on the Artificial Formation of Furfurine, a substance evidently of the same interesting class as the natural vegeto-alkalies, which was published in the Philosophical Transactions for 1845, and was rewarded by the Royal Medal in Chemistry. This was followed by the discovery of another organic base, benzoline. He has also papers in the Transactions upon the Existence of Phosphoric Acid in Rocks of Igneous Origin, and on the Value in Absolute Alcohol of Spirits of different specific gravities. Several communications by him were also published by the Chemical Society, in which Dr. Fownes discharged for several years the office of Secretary.

Dr. Robert Waring Darwin was born at Lichfield on the 30th of May 1766, and died at Shrewsbury in his eighty-third year on the 13th of November 1848. He was the third son of Erasmus Darwin, author of the 'Zoonomia' and 'Botanic Garden.' He was elected a Fellow of the Royal Society in 1788, and in the year 1786 contributed a paper to the Transactions on Coloured Spectra. Having commenced medical practice before he was twenty-one years old, he was unable to pursue any scientific studies, but was actively engaged in his profession for the unusual period of sixty years. In his youth he studied at Leyden, Edinburgh, and Paris; at the latter place he was encouraged to familiar intercourse with Franklin, then in the height of his glory; and at Edinburgh he spent much of his time with the celebrated Dr. Black, of whose extreme simplicity of character and kindness of heart he often repeated anecdotes. In his private character Dr. Darwin was remarkable for sagacity, benevolence, and strong feelings of sympathy, which made him widely beloved by the poor and rich.

Samuel Cooper, late President of the Royal College of Surgeons, and Surgeon to University College Hospital. The general education of his boyhood was received at the celebrated school of Dr. Burney. His professional studies commenced at St. Bartholomew's Hospital about the year 1800, and he became a Member of the College of Surgeons in the year 1803. At an early age he entered the Medical department of the army, and obtained the appointment of a staff-surgeon; but it appears that his actual service in the army was confined to a limited period. His subsequent pro-

fessional career became one of considerable eminence and success. For seventeen years he was one of the Surgeons to University College Hospital, where, to borrow the deserved eulogium conferred on him by an accomplished member of the same profession, "his great surgical knowledge and the kindness and urbanity of his manners in his duties, both as Surgeon to the Hospital and as Professor of Surgery in the Medical School of the College, procured for him the warm attachment of the students." He was for many years a Member of the Council of the Royal College of Surgeons, to which he was elected in 1827, and became also one of their Examiners; and in the year 1845 he was elected President of that body.

It is, however, principally from the merits of his publications that his fame has been derived; and few members of the profession can boast of a more useful career in this respect than Mr. Cooper. His first publication of importance was an Essay on the Diseases of the Joints, which gained the Jacksonian prize of the College of Surgeons in the year 1806. But the great work, by which he became most extensively and honourably known, was his 'Dictionary of Practical Surgery,' first published in the year 1809. This work speedily became and long continued the universal text-book for students, and so valuable a work of reference for older members of the profession, that scarcely a professional library will be found which does not contain it. This work was translated into the French, German, and Italian languages, and was also published in the United States of America; and in this country it passed through numerous large editions. Mr. Cooper had published in 1807 a less elaborate work, entitled 'First Lines of Surgery,' which purported to be more particularly founded on the results of his own practice. This work also reached three editions in the course of six years.

Mr. Cooper became a Fellow of the Royal Society in the year 1846, and was a member of the Council in 1847–8. He did not contribute any paper to the Philosophical Transactions. Latterly he retired very much from professional and public life, and died at his country-residence at Shepperton on the 3rd of December last.

If, as must in truth be acknowledged, the literary and professional labours of Mr. Cooper have not evinced a very high order of intellect, or any great originality of mind, or profound scientific research, yet his course was one of great practical usefulness, and his works have undoubtedly been highly beneficial to the profession, of which he was a deservedly distinguished member.

Sir Graves Chamney Haughton was a native of Dublin, and the son of Dr. Haughton of that city. Having, at an early age, gone to India as a cadet, he acquired, at Fort William College in Calcutta, the foundation of that profound knowledge of Oriental literature and language, for which he was afterwards so distinguished. In 1817, having returned from India, he was appointed a Professor at Haileybury College, but retired from that appointment in 1827. In the year 1832 he was a candidate for the Boden Professorship of Sanscrit in the University of Oxford, but resigned his claims in favour of Mr.

Wilson: his retirement was marked by a very high testimony to his great merit, in a complimentary address, signed by no less than two hundred Graduates of the University, including seven Heads of Houses.

Sir Graves Haughton acted as Honorary Secretary to the Royal Asiatic Society in 1832–33. He became successively a Foreign Member of the Asiatic Society of Paris, a Corresponding Member of the Royal Society of Berlin, a Member of the Institute of France, and of the Asiatic Society of Calcutta, and in 1833 he received the honour of knighthood. He was elected F.R.S. in 1821.

He edited the Institutes of Menu in the original Sanscrit, with a translation revised on that of Sir William Jones; he was also the author of a Bengali Grammar, of a Bengali-Sanscrit and English Dictionary, and other works, particularly a Prodromus of an intended larger work, entitled 'An Enquiry on the Nature of Language.'

Sir Graves died on the 28th of August last, at St. Cloud near Paris, in the 62nd year of his age.

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Edward Forster, Esq., during many years the respected Treasurer and a Vice-President of the Linnæan Society, was the third son of Edward Forster, who was a distinguished merchant and for fifty-two years held the appointment of Governor of the Russia Company in London. He was born at Walthamstow in Essex, on the 12th of October 1765, and resided in that neighbourhood during the whole of his long life. He was for many years a partner in the banking-house of Sir John Lubbock, Forster and Company, and thus became closely associated with the present distinguished head of that house, long the valued Treasurer and Vice-President of the Royal Society.

From a very early period of his life, Mr. Forster was zealously attached to the study of botany, and particularly to the cultivation of a knowledge of British plants, in which department of science he had attained to considerable eminence. He became a Fellow of the Linnæan Society in the year 1800, and from that period till his death he always took great interest in the welfare of that Society. He was elected its Treasurer in 1816, and appointed one of the Vice-Presidents in 1828. In 1821 he was elected a Fellow of the Royal Society, and served on the Council in the years 1839 and 1840.

Mr. Forster did not contribute any paper to the Philosophical Transactions. He was the author of two papers on isolated botanical subjects, published in the Linnæan Transactions, and of several contributions to the scientific periodicals of the day. His knowledge of the species of British plants was remarkably accurate as well as extensive, but he had not devoted his attention, to any great extent, to the science of Botany, strictly so called,—to the minute anatomy, the physiology, and the affinities of plants.

He was, in private life, one of the most amiable and estimable of men, and arrived at a fine old age, surrounded by the affection and reverence of numerous friends, who will long remember with regret the kindliness of his spirit, the almost youthful warmth of his friendship, and the pleasant playfulness, the simple and unaffected urbanity and courtesy of his manners.

He died of cholera on Wednesday the 21st of February in the present year, at the advanced age of eighty-four, after an illness of only a very few days; and it is believed that the disease which proved fatal to him was contracted at one of his frequent visits of mercy at the Refuge for the Destitute, of which institution he was one of the most zealous and efficient supporters.

After having been married nearly fifty years, Mr. Forster became a widower about four years before his death. He left no family.

One who knew him well, has most felicitously applied to him these lines of Flaminius, of which every word is singularly appropriate:—

Fortunate senex, senex beate,
Quo te carmine prædicare possim?
Est domus tibi parva, sed supellex
Munda .... et satis librorum
Magna copia, qui benè ac beatè
Docent vivere: mensa pura, victus
Simplicissimus...
Hæc ad commoda tam beata magnum
Adjungit cumulum hortulus venustus.
Adde quod viridis tibi senectus,
Quod mens candida, candidique mores.
Abest ambitio, timorque lethi,
Et quicquid miseram facit senectam:
Nam Deo pietas amica, vitæ
Et morti bona cuncta pollicetur.

Dr. Prichard was born at Ross, Herefordshire. In early life he manifested a decided bent towards the studies which in after-years occupied so large a portion of his time, and procured for him the elevated rank which he took among men of science. He had great readiness in acquiring languages; and history was his never-failing delight. He chose medicine as a profession, mainly because it was most compatible with his position as a member of the Society of Friends; but he subsequently joined the communion of the Church of England. After graduating in Edinburgh he spent a few terms in Cambridge, and afterwards in Oxford. In the year 1810 he settled in Bristol. He became physician to St. Peter's Hospital and to the Infirmary, and after a few years acquired a large practice, in which he continued to labour till the year 1845, when he removed to London, having been appointed one of the Parliamentary Commissioners in Lunacy. Dr. Prichard was in full vigour of mind and body when his fatal illness befell him, early in December of last year. It was of comparatively short duration, as he died on the 22nd of that month.

In addition to the distinction which he had obtained as a Fellow of the Royal Society, he was elected Corresponding Member of the National Institute of France and of the French Academy of Medicine. All the chief learned societies on the continent and in America sent him diplomas of honorary membership; and in the year 1835 he received the highest honour which the University of Oxford has it in her power to bestow,—the degree of Doctor in Medicine by diploma.

The work by which Dr. Prichard's name is best known out of his own profession, is entitled 'Researches into the Physical History of Mankind.' The first edition was published in 1813, but the germ of it was his Inaugural Thesis 'De Humani Generis Varietate,' printed in 1810. It went through two more editions, each having been entirely re-written. The third was extended into five closely printed volumes, and was only completed in the year 1847. This work is an extensive collection of facts regarding the origin, distribution, history and characters of the different tribes of man; but the facts are so arranged as to illustrate the great argument which runs through the whole treatise, as to the unity of the species. He made a most comprehensive inquiry into the laws which govern the origination and dispersion of all organized beings, especially as to the question whether each species in the animal and vegetable world exists only as the progeny of one race, or has sprung originally from several distinct sources; and arrived at the conclusion that the various tribes of organized beings were originally placed by the Creator in certain regions for which they are by their nature peculiarly adapted; each species having had its beginning in a single pair, and the progeny having been left to disperse themselves according to their locomotive powers, or their capabilities of bearing changes of climate. He argued by analogy that if the races of men belong to one species in the zoological sense, it is extremely improbable that they have descended from more than one stock, especially as their locomotive powers, aided by the resources of human sagacity, are greater than those of brute animals. That they are of one species, he proved by those criteria of identity of species which are afforded:—1. By the principal laws of the animal economy, particularly those governing the duration of life, the period of utero-gestation, and the phenomena of reproduction; 2. By like pathological tendencies; 3. By the fertility of mixed breeds. A very cogent argument in the same direction was derived from the comparison of the psychical qualities of species, as it appears that the species which are most similar to each other and belong to the same genus, are endowed with instincts even more distinct and characteristic than peculiarities of bodily structure. An extensive survey of the human races in this point of view shows that even the most dissimilar are all possessed of common affections and sympathies, and are subjected to precisely analogous laws of feeling and action, and that therefore, in so far as this evidence goes, they belong to one species or lineage. As to the differences in colour, integument, hair, form and structure, he showed that no remarkable instance of variation is discoverable in mankind of which a parallel may not be found in the varieties which arise in the species of the lower animals. These several *analogical* arguments were confirmed by the *historical* investigation of the different races of men, in which the author took occasion to show that all the different physical and psychological characters, which had been before proved by analogy to be within the limits of *mere variation* in species, have actually arisen in repeated instances, and have generally displayed themselves under the

influence of similar external agencies. In tracing the genealogy of nations, Dr. Prichard showed the most abundant and various erudition, not only in his account of all that can be gleaned from historical testimonies, but also in the evidence which he gathered from the relations of languages.

Dr. Prichard, early in his literary career, distinguished himself by his researches in Egyptian learning, having, in the year 1819, published a treatise on Egyptian Mythology. The Chevalier Bunsen has borne testimony to the high character of this work in the following passage:—"Simultaneously with the first steps in the progress of modern hieroglyphical discovery, Dr. Prichard, one of the most acute and learned investigators of his time, had once more vindicated the claims of Egypt to a primeval chronology, and suggested a collection of the lists of Eratosthenes and Manetho as the true method of elucidating the earliest period. In the work on Egyptian chronology and mythology he shows that the continually recurring coincidences which they offer must represent a chronological canon."

Not the least of Dr. Prichard's contributions to science was his inquiry into the origin of the Celtic nations, in which he gave satisfactory proof that their dialects are referable to the same stock as the Sanscrit, Greek, Latin, and Teutonic languages, and thus complete the Indo-European group.

Dr. Prichard enriched the literature of his profession with some very valuable works. His treatise on Nervous Diseases presented the first systematic attempt at discriminating those forms of nervous disorder which owe their origin to irritation in organs remote from the cerebro-spinal centres. His writings on Insanity will ever be remembered as having given distinct expression and proof to the idea that a large number of cases of mental disease are characterized by perversion of the emotions, sentiments, instincts and habitudes of action rather than by intellectual error. To this form of mental disorder he gave the name of *Moral Insanity*.

The remarkable intellectual endowments of this distinguished man are obviously inferrible from the fact that he produced works which in their several departments have attained the highest rank in the estimation of the learned of all countries.

It only remains to be added, that in the domestic and social relations of life his character was conspicuous for integrity, goodness, benevolence and piety. The honour with which his name was greeted abroad was well answered by the affectionate respect which attended it in private circles. His removal from the world of science, while it cannot but be deplored, is yet somewhat compensated by his great works; but the loss to his friends is one that can never be repaired.

Major Thomas Henry Shadwell Clerke expired on the 19th of last April, under an attack of paralysis, at his residence in Brompton Grove. Educated at the Royal Military College of Marlow, he there attained the distinction among his young associates of being a Cadet Officer. Major Clerke was appointed to the 28th

Regiment in 1805. He served with great credit and gallantry in the 5th Regiment during the first years of the Peninsular campaigns, having been present at the general actions of Rolæia, Vimiero, Corunna, and Busaco, and at the combats of Almeida, the Coa, Pombal and Redinha, at the last-mentioned of which places he lost his right leg on the 12th of March 1811. Having become after the conclusion of the war a Captain of the Staff Depôt, he obtained his majority in 1830, and was subsequently named a Knight Companion of the Royal Guelphic order.

Major Clerke was the founder of the United Service Journal, and acted as Editor of that highly useful periodical from its commencement in 1829 until 1842, during which time he zealously seconded every enterprise for the advancement of professional knowledge, literature and science among naval and military officers. In carrying out this object, he was further instrumental in establishing the United Service Museum, of which he became one of the managers.

At the time of his death Major Clerke was a Fellow of the Royal, Geological, Royal Astronomical and Royal Geographical Societies, and it is but justice to his memory to say, that his loss is as deeply deplored by his numerous friends in those bodies, as by his old associates in arms, for his good social qualities, his energy of character and his warmth of heart.

On the motion of Sir Harry Inglis, Bart., seconded by the Lord Chief Baron, the best thanks of the Society were tendered to the President for his excellent address, and his Lordship was requested to permit the same to be printed and circulated to the Society.

The Statutes relating to the election of Officers and Council having been read, and Dr. Webster and Mr. Pratt having, with the consent of the Society, been nominated Scrutators, the votes of the Fellows present were collected.

The following Noblemen and Gentlemen were reported duly elected Officers and Council for the ensuing year:—

President.—The Earl of Rosse.

Treasurer.—George Rennie, Esq.

Secretaries. { Samuel Hunter Christie, Esq., M.A.
Thomas Bell, Esq.

Foreign Secretary.—Lieut.-Col. Edward Sabine, R.A.

Other Members of the Council.—John Couch Adams, Esq., M.A.; John Joseph Bennett, Esq.; Sir Benjamin Collins Brodie, Bart.; Charles Darwin, Esq., M.A.; John Forbes, M.D.; William Robert Grove, Esq., M.A.; Leonard Horner, Esq.; Gideon Algernon Mantell, Esq., LL.D.; William Allen Miller, M.D.; Rev. Henry Mose-

ley, M.A.; Sir Roderick Impey Murchison, M.A.; Richard Owen, Esq.; Rt. Hon. Sir Frederick Pollock, M.A.; Lieut.Col. William Reid, R.E.; Peter Mark Roget, M.D.; Charles Wheatstone, Esq.

The thanks of the Society were given to the Scrutators for their trouble in examining the lists.

On the motion of Sir Robert Harry Inglis, Bart., seconded by Sir Roderick Impey Murchison, it was resolved, that the respectful thanks of the Society be given to Lord John Russell, F.R.S., for the intention which he has announced of recommending to Her Majesty, to grant to the Royal Society, and to confide to the discretion of the Council, the sum of One Thousand Pounds annually as an encouragement for the promotion of Science, and that the President be requested to convey to Lord John Russell, the sense entertained by the Society, as well as by the Council, of His Lordship's zeal thus manifested for the benefit of Science.

The following is a statement of the Receipts and Expenditure during the past year:—

Statement of the Receipts and Payments of the Royal Society between Nov. 29, 1848, and Nov. 29, 1849.

RECEIPTS.

	£	s.	d.
Balance in the hands of the Treasurer at the last Audit ..	484	13	1
Weekly Contributions, at one shilling 46 16 0			
Annual Contributions at £4 ..... 1084 0 0			
	1130	16	0
18 Admission Fees	180	0	0
1 Composition for Annual Payments at £60	60	0	0
4 Compositions for Annual Payments at £40	160	0	0
One year's rent of estate at Mablethorpe: due at Michaelmas 1848 ..... 125 0 0			
One year's Income Tax 3 13 0			
	121	7	0
One year's rent of estate at Acton: due at Michaelmas 1849 ..... 70 0 0			
One year's Income Tax 2 0 10			
	67	19	2
One year's Fee farm rent of lands in Sussex: due at Michaelmas 1849	19	4	0
Two Years' rent from Royal College of Physicians	6	0	0
Carried forward.....	2229	19	3

				£	s.	d.
Brought forward.....				2229	19	3
Dividends on Stock:—						
One year's dividend on £14,000 Reduced 3 per cent. Annuities	420	0	0			
Less Income Tax	12	5	0			
				407	15	0
One year's dividend on £6385 3*s.* 8*d.* 3 per cent. Consols	191	6	6			
Less Income Tax	5	7	2			
				185	19	4
Half a year's dividend on £3452 1*s.* 1*d.* 3 per cent. Consols, produce of sale of premises in Coleman Street	51	15	7			
Less Income Tax	1	10	2			
				50	5	5
Donation Fund.						
One year's dividend on £5331 10*s.* 8*d.* Consols	152	9	9			
Less Income Tax	4	6	4			
				148	3	5
Rumford Fund.						
One year's dividend on £2430 12*s.* 5*d.* Consols	72	17	9			
Less Income Tax	2	1	9			
				70	16	0
Fairchild Fund.						
One year's dividend on £100 New South Sea Annuities				3	0	0
Bakerian Lecture and Copley Medal Fund.						
Half a year's dividend on £366 16*s.* 1*d.* New South Sea Annuities	5	9	0			
Less Income Tax	0	3	1			
				5	5	11
Wintringham Fund.						
One year's dividend on £1200 Consols	36	0	0			
Less Income Tax	1	1	0			
				34	19	0
Miscellaneous Receipts:—						
Sale of Philosophical Transactions, Abstracts of Papers, and Catalogues of the Royal Society's Library				154	1	3
Total Receipts.....				£3290	4	7

PAYMENTS.

	£	s.	d.	£	s.	d.
Fairchild Lecture.—The Rev. J. J. Ellis, for delivering the Fairchild Lecture for 1849				3	0	0
Bakerian Lecture.—M. Faraday, Esq., for the Bakerian Lecture for 1849				4	0	0
Books purchased:						
Dulau and Co.: for Books	31	17	3			
Taylor: for ditto	70	16	11			
Williams: for ditto	2	12	6			
Second-hand, ditto	16	15	6			
				122	2	2
Salaries:—						
S. H. Christie, Esq., one year, as Secretary	105	0	0			
Thomas Bell, Esq., one year, as Secretary	105	0	0			
Ditto for Index to Phil. Trans.	5	5	0			
Col. Sabine, one year, as Foreign Secretary	20	0	0			
Charles R. Weld, Esq., one year, as Assistant-Secretary and Librarian	300	0	0			
Mr. White, one year, as Attendant	90	0	0			
G. Holtzer, one year, as Porter	30	0	0			
Ditto, for extra Porterage	10	0	0			
				665	5	0
Purchase of £487 16*s.* 1*d.* 3 per cent. Consols				450	0	0
Ditto of £366 16*s.* 1*d.* South Sea Annuities				333	6	8
Powers of Attorney				4	6	0
Fire Insurance, on the Society's Property				45	1	6
Gratuity to Bank Clerks				1	1	0
Bills:—						
Taylors:						
Printing the Phil. Trans., 1848, part 2	84	18	0			
Ditto, 1849, part 1	105	15	0			
Ditto, Proceedings, Nos. 71—72; Circulars, Lists of Fellows, Ballot-lists, Statement of Payments, and Minutes of Council; &c. &c.	89	19	0			
				280	12	0
Basire:						
Engraving Plates in Transactions, 1849, part 1	59	0	0			
Ditto, 1849, part 2	101	4	4			
				160	4	4
Carried forward				2068	18	8

		£	s.	d.
Brought forward.....		2068	18	8
Dinkel:				
For Lithography	28 10 0			
Walker:				
For Printing Charts	41 6 2			
		69	16	2
Bowles and Gardiner:				
Paper for the Phil. Trans., 1848, part 2, and 1849, part 1.....		89	2	0
Gyde:				
Boarding and Sewing 800 Parts of Phil. Trans., 1848, part 2	11 4 0			
Ditto, 1849, part 1.....	11 4 0			
Ditto, Extra binding	16 1 8			
		38	9	8
Tuckett:				
Bookbinding	48 14 9			
Limbird:				
For Stationery	13 19 2			
Saunderson:				
For Shipping Expenses	12 4 10			
Vaughan:				
For ditto	2 11 7			
Brecknell and Turner:				
Candles, and Lamp Oil	31 16 6			
Arnold:				
For Coals	27 12 0			
Gwillim:				
Mats, Brushes, Fire-wood, &c.	7 13 5			
Cubitt:				
For repairs and relaying Carpets, &c.....	22 1 10			
Slack:				
For Replating	7 5 8			
Shoolbred:				
For Linen	5 12 6			
Charlton:				
For Cases and Shelves	14 4 0			
Sharpus:				
For China.....	5 1 4			
Humphries:				
For Livery	5 10 0			
Tea, Waiters, &c. at Ordinary Meetings	34 4 6			
		238	12	1
Taxes:				
Land and Assessed Taxes	21 9 7			
Income Tax	4 19 2			
		26	8	9
Carried forward.....		2531	7	4

				£	s.	d.
Brought forward.....				2531	7	4
Donation Fund:						
Mr. Miller, for Meteorological Instruments				25	0	0
Mr. Glaisher, for Reduction of Meteorological Observations				50	0	0
Petty Charges:						
Postage and Carriage.....	41	14	8			
Expenses on Foreign Packets, &c.....	10	12	7			
Stamps	2	2	0			
Charwoman's Wages.....	31	18	0			
Extra Cleaning	10	1	11			
Miscellaneous expenses	34	3	4			
				130	12	6
Balance in the hands of the Treasurer				553	4	9
Total....				£3290	4	7

GEORGE RENNIE, *Treasurer.*

November 30*th*, 1849.

Estates and Property of the Royal Society.

Estate at Mablethorpe, Lincolnshire (55 A. 2 R. 2 P.). Rent £125 per annum.

Estate at Acton, Middlesex (33 acres). Rent £70 per annum.

Fee farm rent in Sussex, £19 4*s.* per annum.

One-fifth of the clear rent of an estate at Lambeth Hill, from the College of Physicians, £3 per annum.

£14,000 Reduced 3 per cent. Annuities.

£18,799 7*s.* 10*d.* Consolidated Bank Annuities.

£466 16*s.* 1*d.* New South Sea Annuities.

The Receipts during the past year, exclusive of the Balance, amounted to:—£2805 11*s.* 6*d.*

The Expenditure during the same period, exclusive of the sum of £783 6*s.* 8*d.* invested in the Funds, was:—£1953 13 2

The Balance in hand, now belonging to the Donation Fund, is £210 5*s.* 11*d.*

The following table shows the progress and present state of the Society with respect to the number of Fellows:—

	Patron and Honorary.	Foreign.	Having compounded.	Paying £2 12s. Annually.	Paying £4 Annually.	Total.
November 1848....	13	48	471	18	264	814
Since elected.....	.....	.....	+4	.....	+15	+19
Since compounded	.....	.....	+1	.....	−1	....
Defaulters	.....	.....	.....	.....	−1	−1
Withdrawn	.....	.....	.....	.....	−1	−1
Since deceased	.....	.....	−18	.....	−5	−23
November 1849....	13	48	458	18	271	808

Annual Contributions.

1830.....	£363	4	0
1831.....	286	0	0
1832.....	255	6	0
1833.....	283	7	6
1834.....	318	18	6
1835.....	346	12	6
1836.....	495	0	0
1837.....	531	0	0
1838.....	599	4	0
1839.....	666	16	0
1840.....	767	4	0
1841.....	815	12	0
1842.....	910	8	0
1843.....	933	16	0
1844.....	1025	16	0
1845.....	1010	0	0
1846.....	1074	0	0
1847.....	1116	8	0
1848.....	1122	16	0
1849.....	1130	16	0